

successful surgical orchiopexy at a later date. Laparoscopy in the diagnosis and treatment of nonpalpable undescended testes should not be considered a necessity, but it can be useful when done by a surgeon proficient in the technique.

Laparoscopic pelvic lymph node dissection to stage urologic malignancy and laparoscopic varicocele ligation have also been reported with good results and appear to be as effective, with equal or less morbidity, as open surgical procedures. The laparoscopic approach is particularly attractive in the staging of prostate and perhaps bladder cancer, as the documentation of metastatic disease by laparoscopy may spare a patient an extensive surgical exploration. Once again, in these indications, laparoscopy should be viewed as an option, possibly beneficial in certain selected patient populations when done by an experienced practitioner, and not as a requirement in the care of these diseases.

Other procedures are now being described in reports from clinical practice or animal laboratories. For example, human nephrectomy has already been performed laparoscopically. Although theoretically there are few limits to the extent to which this technology can be advanced, each potential "advance" must be compared with standard therapy to determine its clinical usefulness, if any.

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Extracorporeal Shock-Wave Lithotripsy With Minimal or No Anesthesia

EXTRACORPOREAL SHOCK-WAVE LITHOTRIPSY (ESWL) has revolutionized the treatment of patients with nephrolithiasis and ranks as one of the great accomplishments of the past decade in medicine. Since its clinical introduction in Germany in 1980 and in the United States in 1984, ESWL has become the procedure of choice for most patients with nephrolithiasis requiring surgical treatment. With literally hundreds of thousands of patients treated worldwide to date, its safety record also compares favorably with any other surgical procedure. Today, major efforts are directed toward improving the ease of ESWL treatment for both patients and physicians, with special emphasis on decreasing anesthesia requirements.

Extracorporeal shock-wave lithotripsy procedures with the German-made Dornier HM3 machine, the original or "first-generation" lithotripter that remains in popular use, nearly always require either general or regional (spinal or epidural) anesthesia. This machine also requires subtotal immersion of the patient within a water bath. Newer second-generation ESWL machines marketed today have almost universally eliminated the need for patient immersion. They also have much-reduced anesthesia requirements. The reduced anesthesia requirements promise a further reduction in the already minimal morbidity associated with ESWL. This reduced anesthesia requirement, however, has been achieved only at the expense of some decrement in machine power. The original Dornier HM3 lithotripter remains the "gold

standard" device in terms of its proven ability to produce adequate stone fragmentation over a wide range of stone size and composition, using the fewest number of shock waves.

Among the second-generation lithotriptors, a variably lessened efficiency in stone fragmentation is weighed against variably lessened anesthesia requirements. At one end of the spectrum of the second-generation lithotriptors are the piezoelectric devices, which produce the least patient discomfort during treatment, allowing many patients to be treated with no anesthesia. Electromagnetic devices now available allow most patients to be treated with only intravenous sedation. Gains in anesthesia requirements, however, are offset to some degree by the need for many more shock waves for each stone and often many treatment sessions. At the other end of the spectrum of second-generation lithotriptors are machines that still use a spark-gap electrode power source, such as the United States-made Medstone STS machine. These machines more closely approximate the fragmentation results and retreatment rates achievable with the original HM3 machine, while still allowing most patients to be treated with only light intravenous sedation.

All of the new second-generation lithotriptors have in common a notable reduction in anesthesia requirement. With their use, patients are awake and comfortable during the treatment of their kidney stones. Patients can be ambulatory and resume normal oral intake immediately after the completion of ESWL and thus be treated as outpatients. Many patients who might otherwise have avoided the treatment of their kidney stones find ESWL much more attractive with such a regimen. Perhaps even more important, the ability to deliver treatment with minimal or no anesthesia extends the ready applicability of ESWL to that group of patients with nephrolithiasis and severe coexisting medical problems in whom the risks of anesthesia might be prohibitive.

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Male Infertility Update

THERE HAVE BEEN SEVERAL advances recently in the field of male infertility, including improvements in vasovasostomy and vasoepididymostomy, the micromanipulation of human gametes, the ease of measuring antisperm antibodies, and further tests of the fertilizing capacity of sperm including the sperm penetration assay (or hamster test).

About 500,000 men a year undergo a vasectomy in the United States for permanent sterilization. With the increase in the divorce and remarriage rates, many of these men wish to have their vasectomies reversed. Beginning in the mid-1970s, the operating microscope came into wide use to aid in the anastomosis of vasa deferens. It soon became apparent that more was needed than simply reconnecting the newly severed ends. At times, the fluid seen from the upstream portion of the vas was inspissated and contained no sperm. With the use of the operating microscope, attempts were then made to reconnect the vas to a proximal area, such as the

epididymis. The results have been encouraging. If sperm are found at the proximal portion of the vas during the operation and if the distal lumen is patent, there is a 90% chance of obtaining spermatozoa in the ejaculate and a 75% pregnancy rate in a year. If no sperm are seen and the fluid is abundant and clear, there is about a 50% chance of a pregnancy in a year. If there are no sperm and the fluid is poor, the chances for pregnancy decrease to about 1%, and a vasoepididymostomy may be indicated. This can only be accomplished using microsurgical techniques. Frequently the tubules proximal to the area of obstruction are dilated and can be easily teased away from the surrounding structures and opened. A vasoepididymostomy can be done when sperm are present, with a fertility rate of about 30% if the vas is connected to the tail of the epididymis. If the vas is connected to the head of the epididymis, a 10% pregnancy rate is reported.

A recently developed test of sperm function is the sperm penetration assay. This assay, which is carried out in several centers around the United States, uses specially prepared hamster eggs incubated with treated sperm to assess the capability of sperm to penetrate the eggs. It was found that the zona pellucida of the hamster egg guards against non-hamster species sperm, the species-specific discriminator. When this is removed, motile sperm from any species can penetrate the hamster egg if the sperm are properly capacitated. This has been a helpful test at in vitro fertilization centers to explain the inability of certain sperm to penetrate human eggs. There is a good correlation between a good score on the sperm penetration assay and the success of an in vitro fertilization procedure. This test has evolved so that patients with

an extremely low sperm count can still be tested using small, specially prepared incubation chambers.

Patients who have a congenital absence of the vas or whose distal portion of the vas is unacceptable for vasectomy reversal can now father children. The patient and his partner undergo a simultaneous aspiration of oocytes from her and spermatozoa from his epididymis. Epididymal aspiration techniques are currently being used in large centers throughout the country for fertilization of these otherwise infertile couples. Briefly, the woman is brought into an in vitro fertilization cycle. On the day of oocyte retrieval, the man undergoes a surgical procedure. At this time, the epididymis is exposed, a single epididymal tubule is teased away from the rest of the epididymis and, using the operating microscope, is incised. The contents are gently aspirated using a special capillary tube. The motile sperm are then processed and used for an in vitro fertilization cycle. Frequently the fertilized ovum is replaced in the fallopian tube at the zygote stage (zygote intrafallopian tube transfer.) If the pre-embryo develops and implants, a pregnancy occurs. Several pregnancies have been reported recently. This has been a recent improvement in our ability to handle patients with congenital absence of the vas and requires special training in centers.

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